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Feature
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Understanding Interventions that Encourage Minorities to Pursue Research Careers: Major Questions and Appropriate Methods

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INTRODUCTION

There is a long history of intervention programs to increase the numbers and enhance the participation of students in scientific research and the pursuit of scientific careers. Many federal agencies have supported these kinds of programs with a goal of enhancing the diversity of the scientific workforce.

Most of these programs operate under the assumption that actively engaging students in research and related professional activities will stimulate their interest in and understanding of science and encourage them to pursue research careers. However, there has been little formal investigation of the short- and long-term effects of such programs and the efficacy of the various program elements. Even though there have been several evaluations of both the federal programs themselves (e.g., National Research Council, 2005) and of individual institutional programs subject to evaluation (e.g., Building Engineering & Science Talent, 2004), there has been little primary research focused on the variables that make particular interventions work for minority students—and why other programs are not successful.

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Since 2005, the National Institute of Health's (NIH) National Institute of General Medical Sciences (NIGMS)[1] and its Division of Minority Opportunities in Research (MORE)[2] have made two sets of grant awards in response to the NIH's Request for Applications (RFA) under the Efficacy of Interventions to Promote Research Careers program (RFA-GM-05-009) and have recently received applications for a fourth round of awards (RFA-GM-08-005).[3] These RFAs were established specifically to "support research that will test assumptions regarding existing or potential interventions that are intended to increase the preparedness for careers in biomedical research, with a particular interest in those interventions specifically designed to increase the number of underrepresented minority students entering careers in biomedical and behavioral research" (page 1).

Undertaking research to study the efficacy of specific interventions in any human population is fraught with many challenges. With increasing expectations for accountability, people who may not have conducted this kind of research previously now must become familiar with new protocols (e.g., statistical), new research regulations (e.g., seeking authorization from Institutional Review Boards to work with human subjects), a different research literature, and new venues for communicating their findings. Many scientists may not have had to confront such a large number of variables, many of which cannot be actively controlled, before engaging in this kind of research. As a result, many scientific researchers are not fully prepared to do the kind of research that has been called for by the NIH RFAs.

In an effort to promote the submission of high-quality grant proposals—and to encourage expanded and imaginative research in this area—the MORE Division asked the National Academies to organize a workshop that would examine the current state of research about interventions that could significantly influence the participation of underrepresented minorities in pursuing research careers in the biomedical and behavioral sciences and other science, technology, engineering, and mathematics (STEM) disciplines.[4] The ultimate goals of this workshop were to help researchers develop appropriate kinds of research questions that measure the contributions of various factors to the success of

[1] For additional information, see http://www.nigms.nih.gov/. Last accessed July 9, 2007.
[2] For additional information, see http://www.nigms.nih.gov/minority. Last accessed July 9, 2007.
[3] Both RFAs are detailed at http://grants.nih.gov/grants/guide/rfa-files/RFA-GM-08-005.html. A general description of the Efficacy of Interventions initiative is available at http://www.nigms.nih.gov/Minority/Efficacy.htm. Both websites were last accessed July 9, 2007.
[4] Supported by Contract No. N01-OD-4-2139 (Task Order No. 172) between the National Academy of Sciences and the NIH, NIGMS, MORE. The sponsors met with the planning committee regarding the statement of task and scope of the project and provided input to the committee on possible topics and speakers. All decisions about the project rested with the committee and the National Academies.

such programs; to offer technical assistance on implementing effective methodologies for studying such interventions; and to encourage the development and coalescence of an interdisciplinary community of scholars and scholarly venues (e.g., journals, conferences, sponsored programs) that are relevant to this area of study. The NIH also requested that this workshop provide technical assistance for those interested in conducting this type of research by exploring pertinent issues, such as developing researchable problems, designing experiments, and incorporating appropriate statistical analyses.

A committee[5] appointed by the National Academies met in person and by teleconference over several months to organize the 1.5-day workshop. Approximately 200 individuals—including many biological researchers and program directors for intervention programs as well as social scientists, statisticians, professional society representatives, officials from federal agencies, and other stakeholders—participated in the meeting, which was held May 3–4, 2007, at the headquarters of the American Association for the Advancement of Science (AAAS) in Washington, DC. This workshop generated considerable interest in this community; in addition to the 200 attendees, another 100 people tried to register but could not be accommodated because of space limitations. This workshop was judged sufficiently important and integral to NIH's mission that Elias Zerhouni, NIH Director, and Jeremy Berg, Director of NIGMS, both addressed the workshop participants.

The workshop featured a number of sessions that explored the kinds of questions, issues, and perspectives that might be associated with studying the effectiveness of interventions that encourage minorities to pursue research careers. After remarks from the committee cochairs and MORE Division Director Clifton A. Poodry, a plenary session featuring experts from psychology (Robert W. Lent from the University of Maryland, College Park, and Claude Steele from Stanford University and Center for Advanced Study in the Behavioral Sciences), higher education studies (Michael T. Nettles from Educational Testing Service), and economics (Anne Preston from Haverford College) presented information on some of the factors affecting career choice and training of underrepresented students and highlighted a variety of research methods and results from their work. Orlando Taylor of Howard University served as a respondent.

David R. Burgess from Boston College and Yolanda S. George from AAAS presented data on the current state of knowledge on these issues and described some ongoing studies. According to these speakers, the programs that have been documented to work to date are often expensive, comprehensive, and small. A national research agenda and data collection effort would help to expand the list of those interventions that have been shown to be successful and help identify why. The speakers also pointed out the factors that facilitate and complicate the progression of underrepresented minorities into graduate programs. They highlighted the need for mentoring and connections between baccalaureate and graduate institutions.

The first day of the workshop also included a three-part technical assistance session that highlighted key steps of conducting research in this area. After Shiva P. Singh from the MORE Division provided an overview of the NIH's Efficacy of Interventions program,[3] Barry R. Komisaruk from Rutgers University and Martin M. Chemers from the University of California, Santa Cruz, provided thoughts about how to pose testable questions for this kind of research, questions that will advance understanding of the efficacy of such interventions. They emphasized that careful formulation of a problem is an especially crucial step because it involves identifying research questions that are broad enough to be important but narrow enough to be answered—or at least informed in a meaningful way—from a feasible research study. After formulating an appropriate problem, the next step is to design a research protocol that is doable, will provide clear answers to the questions posed, and have enough precision and statistical power to detect the effects of interest and relationships/interactions among variables. Larry V. Hedges of Northwestern University (a cochair of the planning committee) discussed this type of research and how it differs from program evaluation, the various types of research design, and the keys to assessing validity of the research design. He argued that multiple research designs are often needed for a valid study, because different techniques have different strengths and weaknesses.

Finally, Kenneth I. Maton from the University of Maryland, Baltimore County (UMBC), highlighted some of the quantitative and qualitative data analysis approaches that are often used in this type of research, drawing examples from studies undertaken for the Meyerhoff Scholarship program at UMBC.[6]

Participants were then able to interact informally, network, and build connections at a reception sponsored by the Howard Hughes Medical Institute.

The second morning of the workshop began with a set of three breakout discussions to allow participants to interact in smaller groups—organized around 1) research-intensive institutions, 2) primarily undergraduate institutions, and 3) scientific societies—to brainstorm about potential research questions and approaches that are appropriate for those kinds of institutions and how to move these questions forward in those institutional settings.

The workshop concluded with a panel on next steps and what is needed to build an ongoing community of scholars interested in research in this area. The panelists included a journal editor (Carol J. Burger from Virginia Polytechnic Institute and State University and Editor of the *Journal of Women and Minorities in Science and Engineering*),[7] a university administrator who has conducted research on minority

[5] Cochairs for the committee were Anthony L. DePass (Long Island University-Brooklyn) and Larry V. Hedges (Northwestern University). Members included Daryl E. Chubin (AAAS), Howard H. Garrison (Federation of American Societies for Experimental Biology), Carol B. Muller (MentorNet), and Karen Kashmanian Oates (Harrisburg University of Science and Technology). Adam P. Fagen served as Study Director with additional involvement of Tova G. Jacobovits and Jay B. Labov.

[6] For additional information, see http://www.umbc.edu/meyerhoff/. Last accessed on July 9, 2007.

[7] For more information, see http://www.begellhouse.com/journals/00551c876cc2f027.html.

students' decisions to pursue graduate education and faculty careers (LaRuth C. McAfee from Case Western Reserve University), and representatives from both private and public supporters of research and training programs (Tuajuanda Jordan from the Howard Hughes Medical Institute and Wanda E. Ward from the National Science Foundation).

This workshop was designed to be one of a series of initial steps to facilitate continuing discussion among a developing cohort of researchers from a variety of disciplines in the natural and social sciences. The National Academies will be publishing a report about the workshop that will summarize the innovative ideas and relevant background discussed therein; that summary is expected to be available in the fall of 2007. The National Academies has also made a number of other resources available on the website for this project,[8] including copies of speakers' presentations and other materials from the meeting, and will be producing a resource list and bibliography for further information.

[8] http://www.nationalacademies.org/moreworkshop.

Given that the NIH and other funding organizations will likely continue to support innovative programs that encourage underrepresented minorities to pursue research and careers in STEM while at the same time demanding more rigorous evidence for the efficacy of such programs, life scientists who are interested in becoming involved with these efforts could benefit from reading the forthcoming report that will provide an overview of the rich information, ideas, and insights that emerged from this workshop.

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